
Patterns of sunscreen use on the face and other exposed skin among US adults

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Background: Sunscreen is a common form of sun protection, but little is known about patterns of use.

Objective: We sought to assess patterns of sunscreen use on the face and other exposed skin among US adults.

Methods: Using cross-sectional data from the 2013 Summer ConsumerStyles survey (N = 4033), we calculated descriptive statistics and adjusted risk ratios to identify characteristics associated with regular sunscreen use (*always/most of the time* when outside on a warm sunny day for ≥ 1 hour).

Results: Few adults regularly used sunscreen on the face (men: 18.1%, 95% confidence interval [CI] 15.8-20.6; women: 42.6%, 95% CI 39.5-46.7), other exposed skin (men: 19.9%, 95% CI 17.5-22.6; women: 34.4%, 95% CI 31.5-37.5), or both the face and other exposed skin (men: 14.3%, 95% CI 12.3-16.6; women: 29.9%, 95% CI 27.2-32.8). Regular use was associated with sun-sensitive skin, an annual household income \geq \$60,000, and meeting aerobic activity guidelines (P s < .05). Nearly 40% of users were unsure if their sunscreen provided broad-spectrum protection.

Limitations: Reliance on self-report and lack of information on sunscreen reapplication or other sun-safety practices are limitations.

Conclusion: Sunscreen use is low, especially among certain demographic groups. These findings can inform sun-safety interventions and the interpretation of surveillance data on sunscreen use. (J Am Acad Dermatol 2015;73:83-92.)

Key words: broad spectrum; skin cancer prevention; sun protection; sun protection factor; sun safety; sunscreen.

Sunscreen is a common form of sun protection used by US adults.¹⁻⁴ According to National Health Interview Survey (NHIS) data, approximately one third of adults *usually or always* use sunscreen when outdoors in the sun for 1 hour or more.⁴ Furthermore, a study of media coverage on skin cancer prevention found more content about sunscreen than other recommended prevention strategies.⁵ If used properly, regular sunscreen use can reduce risk for skin cancer^{6,7} and prevent or

Abbreviations used:

CDC:	Centers for Disease Control and Prevention
CI:	confidence interval
NHIS:	National Health Interview Survey
SPF:	sun protection factor
UV:	ultraviolet

delay photoaging of the skin.⁸⁻¹⁰ In 2011, the US Food and Drug Administration updated regulations

From the Centers for Disease Control and Prevention, Division of Cancer Prevention and Control.

Funded by the Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Cancer Prevention and Control. The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Conflicts of interest: None declared.

Preliminary findings from this work were presented as a poster at the Society of Behavioral Medicine Annual Meeting in Philadelphia, Pennsylvania, April 24, 2014.

Accepted for publication February 13, 2015.

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Published online May 19, 2015.

0190-9622

Published by Elsevier on behalf of the American Academy of Dermatology, Inc.

<http://dx.doi.org/10.1016/j.jaad.2015.02.1112>

on sunscreen labeling to help consumers select and properly use sunscreens.¹¹ Sunscreen products that provide a sun protection factor (SPF) of 15 or higher and broad-spectrum protection (ie, protection from both ultraviolet [UV]A and UVB radiation) are labeled as protecting against sunburn, and, if used as directed, reducing the risk for skin cancer and early skin aging.

National surveys (eg, NHIS¹²) have assessed sunscreen use among US adults but do not differentiate between use on the face versus other exposed skin and do not capture whether the sunscreen provides broad-spectrum protection. Given the variety of cosmetics on the market that are labeled as providing sun protection, sunscreen use on the face is likely to be distinct from use on other exposed skin, particularly among women.

The purpose of this study is to examine patterns of sunscreen use on the face and other exposed skin among US adults.

METHODS

We used data from Porter Novelli's 2013 Summer ConsumerStyles survey to examine sunscreen use among US adults aged 18 years or older. The ConsumerStyles are cross-sectional online surveys designed to capture the public opinions, beliefs, and trends in health behavior. Participants are from the GfK Knowledge Panel,¹³ which is randomly recruited by probability-based sampling using both random-digit dialing and address-based sampling methods to reach respondents regardless of landline telephone or Internet availability. If needed, households are provided with a laptop computer and access to the Internet. The survey was fielded from June 28 through July 26, 2013.

Outcome measures

Sunscreen use on the face was assessed by 3 questions:

1. When you go outside on a warm sunny day for more than 1 hour, how often do you use sunscreen on your face? [*always; most of the time; sometimes; rarely; never*]
2. What is the SPF number of the sunscreen you usually use on your face? [*1-14; 15-49; ≥50; not sure*]

3. Does the sunscreen you usually use on your face provide broad-spectrum (UVA and UVB) protection? [*yes; no; not sure*]

Three similar questions asked about sunscreen use on "other exposed skin (not including your face)."

CAPSULE SUMMARY

- Sunscreen is a recommended form of sun protection.
- Sunscreen use is low among US adults, especially men, those with less sun-sensitive skin, and low-income groups. Use on the face but not on other exposed skin is common among women.
- These findings can inform future sun-safety intervention efforts targeting specific demographic groups.

Other variables of interest

The survey included a question previously used on the NHIS¹² that asks about the skin's reaction to being "out in the sun for an hour without sunscreen, a hat, or protective clothing." Response options were: (1) *get a severe sunburn with blisters*, (2) *have a moderate sunburn with peeling*, (3) *burn mildly with some or no tanning*, (4) *turn darker without sunburn*, and (5)

nothing would happen to my skin. Similar to the Fitzpatrick scale,¹⁴ this variable measures sun sensitivity by assessing the skin's tendency to burn, but the question also captures the severity of the burn. Sun-sensitive skin was defined as a skin that sunburns (response options 1-3). Other variables included gender, age, race/ethnicity, geographic region, household income, having skin cancer in the past year, having a cancer other than skin cancer in the past year, having 1 or more children younger than 18 years, meeting the 2008 Physical Activity Guidelines for Americans¹⁵ for aerobic activity (based on self-reported average weekly physical activity; referred to as "aerobic activity guidelines" in subsequent text), body mass index (based on self-reported height and weight), and cigarette smoking status.

Data analysis

The survey was sent to 6102 adults aged 18 years or older. A total of 4033 adults completed the survey (answered at least half the questions), yielding a response rate of 66%. The resulting data were weighted using 9 factors: gender, age, household income, race/ethnicity, household size, education, census region, metro status, and prior Internet access to be representative of the US population.

We calculated the unadjusted frequency of sunscreen use on the face and on other exposed skin when outside on a warm, sunny day for more than 1 hour among all participants. Among

participants who reported using sunscreen *always*, *most of the time*, *sometimes*, or *rarely*, we calculated the unadjusted percentages of responses to the questions about characteristics of the sunscreen used (SPF and broad-spectrum protection). We defined regular sunscreen use as using sunscreen *always* or *most of the time* when outside on a warm, sunny day for more than 1 hour. To examine the association between individual characteristics and regular sunscreen use, we computed unadjusted percentages and adjusted risk ratios derived from the predicted marginals.¹⁶ Analyses were stratified by the site of sunscreen use (on the face and on other exposed skin) and by gender. *P* values < .05 were considered statistically significant. Calculations were performed with SAS-callable SUDAAN (RTI International, Research Triangle Park, NC) to account for the complex sampling design and nonresponse. Percentages were weighted to generalize results to the study population. Differences between groups were assessed with general linear contrasts. Centers for Disease Control and Prevention (CDC) licenses the Summer ConsumerStyles data from Porter Novelli. Our analyses were considered exempt by CDC Institutional Review Board because we used secondary data and personal identifiers were not included in the data.

RESULTS

Weighted percentages of demographic characteristics of the study population are shown in Table I. Most were non-Hispanic white (67.4%) and had an annual household income of \$40,000 or more (66.8%). Supplemental Table I (available at <http://www.jaad.org>) compares the survey data (weighted and unweighted) with the 2013 Census estimates for select demographic variables.

Overall, 18.1% (95% confidence interval [CI] 15.8-20.6) of men and 42.6% (95% CI 39.5-46.7) of women regularly used sunscreen on the face, whereas 19.9% (95% CI 17.5-22.6) of men and 34.4% (95% CI 31.5-37.5) of women regularly used sunscreen on other exposed skin (Fig 1). Regularly using sunscreen on both the face and other exposed skin was more prevalent among women (29.9%, 95% CI 27.2%-32.8%) than among men (14.3%, 95% CI 12.3%-16.6%). A higher percentage of men *never* used sunscreen (on the face: 43.8%, 95% CI 40.5-47.1; on other exposed skin: 42.1%, 95% CI 38.8-45.4) compared with women (on the face: 27.0%, 95% CI 24.2-30.0; on other exposed skin: 26.8%, 95% CI 24.0-29.8) (Fig 1). Among sunscreen users, over 80% used a sunscreen with an SPF of 15 or higher (Fig 2). On the face, 57.3% (95% CI 54.5-60.1) used sunscreen with an SPF of 15-49; 26.8% (95% CI 24.3-29.4) used

Table I. Weighted percentage of demographic characteristics of the study population—2013 Summer ConsumerStyles (n = 4033)

	% (95% CI)
Gender	
Male	48.1 (45.9-50.4)
Female	51.9 (49.6-54.1)
Age, y	
18-24	12.2 (10.6-14.1)
25-34	17.3 (15.6-19.3)
35-44	16.7 (15.0-18.5)
45-54	18.4 (16.7-20.1)
55-64	16.8 (15.3-18.5)
≥65	18.6 (17.0-20.2)
Race/ethnicity	
Non-Hispanic white	67.4 (65.1-69.6)
Non-Hispanic black	11.3 (9.8-12.9)
Hispanic	14.2 (12.5-16.1)
Non-Hispanic other	7.2 (5.9-8.6)
Region	
Northeast	18.4 (16.7-20.2)
Midwest	21.7 (19.9-23.6)
South	37.2 (35.0-39.4)
West	22.7 (20.9-24.8)
Annual household income	
<\$25,000	18.4 (16.6-20.3)
\$25,000-<\$40,000	14.8 (13.3-16.5)
\$40,000-<\$60,000	17.2 (15.6-18.9)
≥\$60,000	49.6 (47.4-51.9)

n = Sample size.

Percentages and 95% CIs are weighted to the study population. CI, Confidence interval.

sunscreen with an SPF of 50 or higher. On other exposed skin, 55.2% (95% CI 52.5-58.0) used sunscreen with an SPF of 15 to 49; 27.6% (95% CI 25.1-30.2) used sunscreen with an SPF of 50 or higher. About 60% used broad-spectrum sunscreen (face: 60.6%, 95% CI 57.8-63.2; other exposed skin: 59.4, 95% CI 56.6-62.1), but almost 40% of users (face: 37.6%, 95% CI 35.0-40.3; other exposed skin: 38.6%, 95% CI 36.0-41.4) were not sure if their sunscreen provided broad-spectrum protection.

In the unadjusted analyses, regular sunscreen use on the face and on other exposed skin was associated with race/ethnicity among both men and women (all *P* values < .001) (Table II). Compared with non-Hispanic whites, non-Hispanic blacks were less likely to use sunscreen regularly on the face or on other exposed skin. Hispanics were less likely to regularly use sunscreen on other exposed skin. A higher likelihood of regular use was observed among men and women with more sun-sensitive skin compared with those whose skin did not sunburn (all *P* values < .001), those with an annual household income of \$60,000 or more

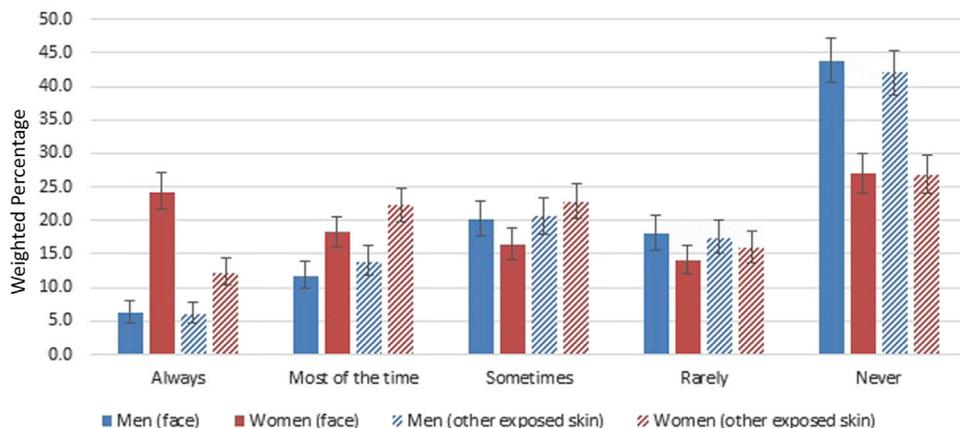


Fig 1. Unadjusted frequency of sunscreen use on the face and other exposed skin by gender among US adults when outside on a warm, sunny day for more than 1 hour.

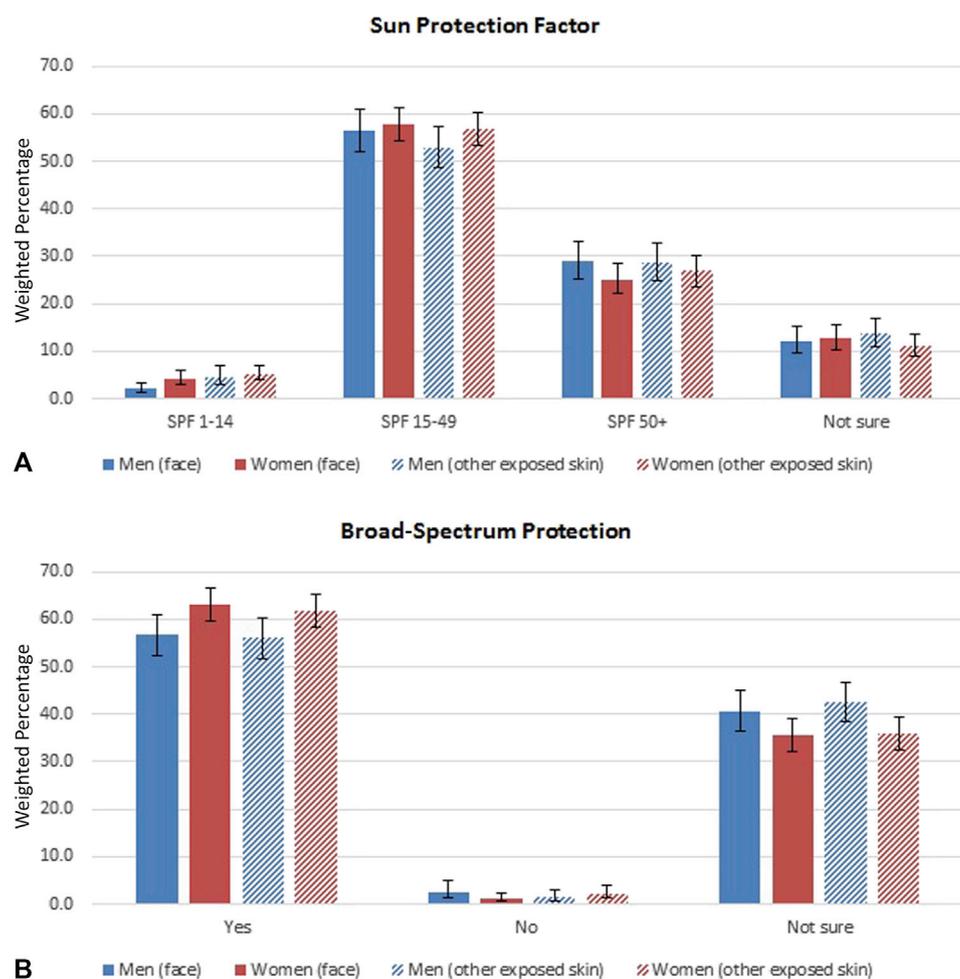


Fig 2. Knowledge of the characteristics (**A**, sun protection factor and **B**, broad-spectrum protection) of the sunscreen used on the face and other exposed skin by gender among US adults.

compared with those with an annual household income below \$25,000 (all *P* values < .001), those who met aerobic activity guidelines (all

P values < .05), and those who were not current smokers (all *P* values < .05). Regular sunscreen use on the face varied significantly by region among men

($P = .009$), and regular use on other exposed skin varied significantly by region among women ($P = .030$). Variation by age was observed among both men and women for regular sunscreen use on other exposed skin only (P values = $.005$ and $.016$, respectively). Among both men and women, those who had 1 or more children younger than 18 years were more likely to use sunscreen on other exposed skin ($P < .05$). Among women only, those given a diagnosis of skin cancer in the past year were more likely to regularly use sunscreen on the face ($P = .010$), and those who were overweight or obese were less likely to use sunscreen on the face or other exposed skin than their counterparts (all P values $< .001$).

After adjusting for all other variables in the models, we observed that among both men and women, those with more sun-sensitive skin were more likely to regularly use sunscreen on the face and on other exposed skin compared with those whose skin did not sunburn (all P values $< .001$) (Table III). In addition, adults with an annual household income below \$60,000 were significantly less likely to use sunscreen regularly compared with those with higher incomes (all P values $< .001$). Among women only, non-Hispanic blacks were significantly less likely to regularly use sunscreen on the face or other exposed skin compared with non-Hispanic whites (all P values $< .05$). Among men only, those living in the Northeast were more likely to regularly use sunscreen on the face compared with those living in the Midwest and South ($P = .04$). Those who met aerobic activity guidelines were significantly more likely to regularly use sunscreen than those who did not (all P values $< .05$), with the exception of male sunscreen use on other exposed skin ($P = .056$). Among women only, those who were overweight or obese were less likely to regularly use sunscreen on the face compared with women of a healthy weight ($P = .016$), and current smokers were less likely to regularly use sunscreen on the face or on other exposed skin compared with nonsmokers (all P values $< .05$).

DISCUSSION

About 30% of women and less than 15% of men regularly use sunscreen on both the face and other exposed skin. Some adults, particularly women, use sunscreen regularly on the face but not on other exposed skin. This pattern may reflect the many cosmetic products containing SPF that are marketed to women for use on the face. Similarly, focus group data collected in 1997 suggested that women may focus sunscreen use on the face for antiaging

purposes.¹⁷ Estimates that do not differentiate between use on the face versus other exposed skin should be interpreted with caution. Sun-safety messages should encourage women to protect all skin from the sun rather than just the face.

The association between sunscreen use and demographic characteristics is informative for future intervention efforts. For example, consistent with previous findings, this study suggests that sunscreen use is low among non-Hispanic blacks and those who tend not to sunburn.^{1,2,4} These groups may have a lower perceived susceptibility to sun damage and need guidance on balancing the risks and benefits of sun exposure, given the variation in susceptibility even within racial/ethnic groups.¹⁸⁻²¹ Similar to previous findings, men tend to use sunscreen less frequently than women, and many do not use sunscreen at all.^{1,2,4} Men may view sunscreen as nonmasculine, messy, or inconvenient,^{22,23} and sunscreen advertisements target women more often than men.^{24,25} Men may rely on protective clothing and shade more than sunscreen,² and these alternatives could be encouraged. However, there may still be times when sunscreen is necessary for adequate protection, and more research is needed to develop effective sun-safety interventions targeting men. The inverse association between sunscreen use and household income suggests that cost may be a barrier to sunscreen use, a concern also raised by others.^{22,26} Creating environmental supports for sun safety (eg, providing free sunscreen or shade in outdoor settings) may mitigate individual-level barriers such as cost.

Regular sunscreen use was also associated with health-related factors. The positive relationship between sunscreen use and aerobic activity is noteworthy given previous findings that adults who are more physically active are more likely to experience sunburn.²¹ Although seemingly contradictory, these findings may reflect increased time outdoors and greater total sun exposure among the more physically active, creating a need for more vigilant protection. The association between body mass index and sunscreen use was consistent with other studies that have indicated higher body mass index is positively associated with skin cancer risk behaviors^{27,28} and sunburn.²¹ Regular sunscreen use was not significantly associated with having skin cancer in the past year in the adjusted analyses, suggesting a need for interventions targeting this high-risk group. There was also no significant association between having a child younger than 18 years and sunscreen use. Parents provide sun protection and serve as role models for their children

Table II. Unadjusted percentages of US adults who regularly use sunscreen on the face and on other exposed skin by gender and by demographic and other individual characteristics—2013 Summer ConsumerStyles

	Face				Other exposed skin			
	Men (n = 1918)		Women (n = 2115)		Men (n = 1918)		Women (n = 2115)	
	% (95% CI)	<i>P</i> value	% (95% CI)	<i>P</i> value	% (95% CI)	<i>P</i> value	% (95% CI)	<i>P</i> value
Age, y		.389		.192		.005		.016
18-24	16.9 (10.5-26.2)		36.1 (26.8-46.5)		20.5 (13.0-30.8)		34.6 (25.4-45.2)	
25-34	18.3 (12.8-25.6)		47.1 (39.1-55.2)		23.5 (17.2-31.3)		39.4 (31.8-47.6)	
35-44	21.1 (15.2-28.7)		49.5 (41.5-57.4)		26.7 (19.8-34.9)		44.6 (36.9-52.7)	
45-54	18.8 (14.3-24.3)		38.5 (32.2-45.3)		19.2 (14.7-24.8)		29.4 (23.9-35.6)	
55-64	13.7 (10.3-18.0)		40.3 (33.7-47.3)		11.9 (8.8-15.9)		31.7 (25.5-38.5)	
≥65	19.1 (14.6-24.6)		42.6 (36.4-49.0)		17.4 (13.2-22.6)		28.8 (23.5-34.8)	
Race/ethnicity		<.001		<.001		<.001		<.001
Hispanic	16.0 (10.3-23.9)		36.3 (27.2-46.5)		11.9 (7.4-18.8)		25.7 (18.2-35.1)	
Non-Hispanic black	4.3 (2.0-9.2)		15.0 (9.4-23.1)		7.2 (3.2-15.5)		10.1 (5.7-17.3)	
Non-Hispanic other	7.5 (3.5-15.0)		41.9 (30.0-54.9)		6.5 (3.0-13.4X)		36.4 (24.8-49.8)	
Non-Hispanic white	21.9 (19.1-25.0)		48.5 (45.0-52.0)		25.1 (22.0-28.6)		40.0 (36.5-43.5)	
Skin reaction to 1 h unprotected in the sun		<.001		<.001		<.001		<.001
Severe sunburn	35.8 (26.1-46.9)		61.2 (52.1-69.5)		40.6 (29.9-52.3)		59.4 (50.5-67.7)	
Moderate sunburn	26.3 (21.7-31.6)		53.9 (48.4-59.3)		28.8 (24.0-34.2)		45.5 (40.1-51.0)	
Mild sunburn	19.4 (15.2-24.4)		43.1 (37.6-48.8)		21.8 (17.2-27.1)		30.4 (25.5-35.8)	
Turn darker without sunburn/ nothing would happen to skin	6.2 (4.0-9.5)		24.8 (19.9-30.4)		6.6 (4.1-10.4)		18.6 (14.2-24.0)	
Region		.009		.452		.067		.030
Northeast	25.9 (19.7-33.3)		44.0 (37.1-51.2)		26.3 (19.8-33.9)		42.4 (35.5-49.7)	
Midwest	14.2 (10.8-18.6)		40.4 (34.3-46.8)		16.3 (12.2-21.4)		32.0 (26.2-38.3)	
South	14.9 (11.6-19.0)		40.4 (35.4-45.7)		17.6 (14.0-21.9)		30.1 (25.6-35.1)	
West	21.2 (16.3-27.1)		46.5 (40.0-53.1)		22.6 (17.3-28.8)		36.9 (30.9-43.4)	
Annual household income		<.001		<.001		<.001		<.001
<\$25,000	7.6 (4.9-11.5)		26.0 (19.8-33.4)		9.6 (6.5-13.9)		15.6 (10.9-21.9)	
\$25,000-<\$40,000	16.9 (11.7-23.7)		36.0 (29.0-43.5)		15.7 (10.9-22.2)		28.0 (21.6-35.3)	
\$40,000-<\$60,000	15.9 (11.5-21.6)		36.3 (30.0-43.0)		15.4 (11.1-20.8)		31.9 (25.8-38.7)	
≥\$60,000	23.3 (19.6-27.4)		52.4 (48.0-56.8)		26.9 (22.8-31.4)		43.7 (39.4-48.1)	
Has ≥1 child age <18 y		.264		.102		.013		.019
Yes	20.5 (15.8-26.1)		46.6 (40.7-52.7)		26.2 (20.6-32.6)		40.2 (34.5-46.3)	
No	17.2 (14.7-20.0)		40.8 (37.3-44.4)		17.7 (15.1-20.6)		32.0 (28.7-35.5)	
Has or had skin cancer in past year		.081		.010		.093		.287
Yes	31.0 (18.4-47.3)		70.6 (51.7-84.3)		32.3 (19.4-48.6)		46.5 (27.5-66.5)	
No	17.7 (15.4-20.3)		42.0 (39.0-45.2)		19.4 (16.9-22.1)		34.1 (31.2-37.2)	

Has or had cancer other than skin cancer in past year		.789		.420		.972		.203
Yes	19.7 (10.1-34.8)		34.2 (18.1-55.1)		19.5 (9.9-34.6)		22.9 (10.8-42.2)	
No	18.0 (15.7-20.5)		42.6 (39.5-45.7)		19.7 (17.2-22.4)		34.4 (31.5-37.5)	
Meets recommendations for aerobic activity*		.037		<.001		.011		<.001
Yes	20.2 (17.2-23.5)		50.4 (46.1-54.8)		22.7 (19.4-26.3)		41.1 (36.9-45.4)	
No	15.0 (11.7-19.0)		35.6 (31.5-40.1)		15.9 (12.4-20.3)		28.7 (24.8-33.0)	
Overweight or obese†		.641		<.001		.714		<.001
Yes	17.7 (15.0-20.7)		37.2 (33.3-41.3)		20.1 (17.2-23.4)		30.3 (26.6-34.3)	
No	18.9 (14.9-23.7)		51.0 (46.1-56.0)		19.1 (15.0-24.0)		41.7 (36.9-46.6)	
Current smoker		.023		<.001		.022		<.001
Yes	12.8 (8.3-19.1)		28.6 (21.3-37.3)		14.4 (9.5-21.1)		18.6 (12.8-26.2)	
No	19.9 (17.3-22.9)		46.0 (42.6-49.4)		22.1 (19.2-25.3)		37.5 (34.2-40.8)	

n = sample size.

Regular sunscreen use is defined as using sunscreen *always* or *most of the time* when outside on a warm, sunny day for >1 h.

Percentages and 95% CIs are weighted to the study population.

P value was calculated with the Wald F statistic (for multivariable analysis).

CI, Confidence interval.

*Met the Physical Activity Guidelines for Americans (for aerobic activity).¹⁵

†Body mass index of ≥ 25 .³⁴

Table III. Adjusted risk ratios for regular sunscreen use on the face and other exposed skin, by gender and by demographic and other individual characteristics—2013 Summer ConsumerStyles

	Face				Other exposed skin			
	Men (n = 1751)		Women (n = 1863)		Men (n = 1749)		Women (n = 1858)	
	Risk ratio (95% CI)	P value						
Age, y		.783		.226		.010		.466
18-24	0.8 (0.5-1.5)		0.7 (0.5-0.9)		1.4 (0.8-2.3)		1.0 (0.7-1.4)	
25-34	1.1 (0.7-1.8)		1.0 (0.8-1.2)		1.7 (1.1-2.5)		1.1 (0.9-1.5)	
35-44	1.2 (0.7-1.8)		1.0 (0.8-1.3)		1.4 (0.9-2.2)		1.3 (0.9-1.7)	
45-54	1.1 (0.8-1.6)		0.9 (0.8-1.2)		1.2 (0.8-1.8)		1.0 (0.8-1.3)	
55-64	0.9 (0.6-1.3)		1.0 (0.8-1.2)		0.8 (0.6-1.2)		1.1 (0.9-1.5)	
≥65	Ref		Ref		Ref		Ref	
Race/ethnicity		.010		.010		<.001		.019
Hispanic	0.9 (0.6-1.3)		0.9 (0.7-1.2)		0.5 (0.3-0.9)		0.8 (0.6-1.1)	
Non-Hispanic black	0.5 (0.2-1.1)		0.5 (0.3-0.8)		0.7 (0.4-1.5)		0.5 (0.3-0.9)	
Non-Hispanic other	0.3 (0.1-0.7)		1.0 (0.8-1.3)		0.3 (0.1-0.6)		1.1 (0.8-1.5)	
Non-Hispanic white	Ref		Ref		Ref		Ref	
Skin reaction to 1 h unprotected in the sun		<.001		<.001		<.001		<.001
Severe sunburn	4.6 (2.6-8.0)		2.1 (1.7-2.7)		4.5 (2.6-7.6)		2.6 (1.9-3.5)	
Moderate sunburn	2.9 (1.7-4.7)		1.7 (1.4-2.2)		3.0 (1.9-4.9)		1.9 (1.4-2.5)	
Mild sunburn	2.3 (1.4-3.8)		1.4 (1.1-1.8)		2.4 (1.5-4.1)		1.2 (0.9-1.7)	
Turn darker without sunburn/nothing would happen to skin	Ref		Ref		Ref		Ref	
Region		.026		.702		.148		.220
Midwest	0.6 (0.4-0.9)		1.0 (0.8-1.3)		0.7 (0.5-1.0)		0.8 (0.6-1.0)	
South	0.7 (0.5-1.0)		1.1 (0.9-1.3)		0.8 (0.6-1.2)		0.8 (0.7-1.0)	
West	1.0 (0.7-1.4)		1.1 (0.9-1.3)		1.0 (0.7-1.5)		0.9 (0.7-1.1)	
Northeast	Ref		Ref		Ref		Ref	
Annual household income		<.001		<.001		<.001		<.001
<\$25,000	0.4 (0.3-0.7)		0.7 (0.5-0.8)		0.5 (0.4-0.8)		0.5 (0.3-0.7)	
\$25,000-<\$40,000	0.7 (0.5-1.0)		0.8 (0.6-0.9)		0.6 (0.4-0.8)		0.8 (0.6-1.0)	
\$40,000-<\$60,000	0.6 (0.4-0.9)		0.7 (0.6-0.8)		0.6 (0.4-0.8)		0.7 (0.6-0.9)	
≥\$60,000	Ref		Ref		Ref		Ref	
Has ≥1 child age <18 y		.674		.521		.297		.396
Yes	1.1 (0.8-1.5)		1.1 (0.9-1.3)		1.2 (0.9-1.6)		1.1 (0.9-1.4)	
No	Ref		Ref		Ref		Ref	
Has or had skin cancer in past year		.199		.061		.135		.271
Yes	1.4 (0.9-2.3)		1.4 (1.1-1.9)		1.4 (0.9-2.2)		1.3 (0.9-1.9)	
No	Ref		Ref		Ref		Ref	
Has or had cancer other than skin cancer in past year		.803		.259		.776		.252
Yes	1.1 (0.6-2.0)		0.8 (0.5-1.3)		1.1 (0.6-1.9)		0.8 (0.4-1.3)	
No	Ref		Ref		Ref		Ref	

Meets recommendations for aerobic activity*							
Yes	1.4 (1.0-1.8)	.039	1.4 (1.2-1.6)	<.001	1.3 (1.0-1.7)	.056	1.4 (1.2-1.6)
No	Ref		Ref		Ref		Ref
Overweight or obese†							
Yes	0.8 (0.6-1.1)	.147	0.8 (0.7-1.0)	.016	1.0 (0.7-1.3)	.918	0.9 (0.8-1.1)
No	Ref		Ref		Ref		Ref
Current smoker							
Yes	0.9 (0.6-1.4)	.601	0.8 (0.6-1.0)	.047	0.9 (0.6-1.4)	.637	0.7 (0.5-0.9)
No	Ref		Ref		Ref		Ref

Results for each variable are adjusted for all other covariates in the model.
Regular sunscreen use is defined as using sunscreen *always* or *most* of the time when outside on a warm, sunny day for > 1 h.
n = sample size.

Risk ratios and 95% CIs are weighted to the study population.
P value was calculated with the Wald F statistic.

CI, Confidence interval.

*Met the Physical Activity Guidelines for Americans (for aerobic activity).¹⁵

†Has a body mass index of ≥ 25 .³⁴

and should be encouraged to protect both themselves and their families from the sun.

Sunscreen works best when used as directed and in combination with other forms of sun protection.²⁹ Among sunscreen users, nearly 40% were unsure if their sunscreen provided broad-spectrum protection. When a sunscreen does not provide adequate protection, users may have a false sense of protection, possibly leading to more total sun exposure.³⁰ Additional guidance on characteristics to look for in a sunscreen and provision of sun-safety supports at the community level (eg, accessible consumer information about effective protection strategies and shade planning in outdoor settings) could complement and support individual sun-safety efforts.³¹ The Community Preventive Services Task Force provides guidance on evidence-based community-level skin cancer prevention interventions,³² and the US Preventive Services Task Force provides guidance on skin cancer prevention counseling in clinical settings.³³

Limitations

This study has several limitations. One, the study relies on self-reported information, which is subject to social desirability bias. Two, the study had a 66% response rate and potential for nonresponse bias. However, we weighted the data to the US population and accounted for nonresponse, which may have mitigated this effect. Three, the study did not include data on other skin cancer risk-related behaviors or the context in which sunscreen was used (eg, use of other forms of sun protection), all of which factor into ensuring adequate sun protection.

Conclusion

This study provides new information about patterns of adult sunscreen use. Sunscreen use is particularly low among certain groups such as men, non-Hispanic blacks, those with less sun-sensitive skin, and those with lower incomes. These groups may benefit from guidance on alternative methods of sun protection. Many users are unsure if their sunscreen provides broad-spectrum protection, and among women, regularly using sunscreen on the face but not on other exposed skin is common. Additional guidance on how to most effectively use sunscreen is warranted. Environmental supports such as shade in outdoor settings could complement efforts to promote individual sun safety.

REFERENCES

- Buller DB, Cokkinides V, Hall HI, et al. Prevalence of sunburn, sun protection, and indoor tanning behaviors among Americans: review from national surveys and case studies of 3 states. *J Am Acad Dermatol*. 2011;65(5 Suppl 1):S114-S123.
- Centers for Disease Control and Prevention. Sunburn and sun protective behaviors among adults aged 18-29 years—United States, 2000-2010. *MMWR*. 2012;61(18):317-322.
- Linos E, Keiser E, Fu T, Colditz G, Chen S, Tang JY. Hat, shade, long sleeves, or sunscreen? Rethinking US sun protection messages based on their relative effectiveness. *Cancer Causes Control*. 2011;22(7):1067-1071.
- National Cancer Institute. Cancer trends progress report — 2011/2012 update. Available from: URL: <http://progressreport.cancer.gov/>. Accessed September 2, 2014.
- Cokkinides V, Kirkland D, Andrews K, Sullivan K, Lichtenfeld JL. A profile of skin cancer prevention media coverage in 2009. *J Am Acad Dermatol*. 2012;67(4):570-575.
- Green AC, Williams GM, Logan V, Strutton GM. Reduced melanoma after regular sunscreen use: randomized trial follow-up. *J Clin Oncol*. 2011;29(3):257-263.
- van der Pols JC, Williams GM, Pandeya N, Logan V, Green AC. Prolonged prevention of squamous cell carcinoma of the skin by regular sunscreen use. *Cancer Epidemiol Biomarkers Prev*. 2006;15(12):2546-2548.
- Fisher GJ, Kang S, Varani J, et al. Mechanisms of photoaging and chronological skin aging. *Arch Dermatol*. 2002;138(11):1462-1470.
- Wlaschek M, Tantcheva-Poor I, Naderi L, et al. Solar UV irradiation and dermal photoaging. *J Photochem Photobiol B*. 2001;63(1-3):41-51.
- Hughes MC, Williams GM, Baker P, Green AC. Sunscreen and prevention of skin aging: a randomized trial. *Ann Intern Med*. 2013;158(11):781-790.
- U.S. Food and Drug Administration. Labeling and effectiveness testing; sunscreen drug products for over-the-counter human use. Federal Register 76(117): 21 CFR Parts 201 and 310. Available from: URL: <http://www.gpo.gov/fdsys/pkg/FR-2011-06-17/pdf/2011-14766.pdf>. Accessed September 2, 2014.
- Centers for Disease Control and Prevention. National Health Interview Survey. Available from: URL: <http://www.cdc.gov/nchs/nhis.htm>. Accessed September 2, 2014.
- GfK. GfK Knowledge Panel. Available from: URL: <http://www.gfk.com/us/Solutions/consumer-panels/Pages/GfK-KnowledgePanel.aspx>. Accessed September 4, 2014.
- Fitzpatrick TB. The validity and practicality of sun-reactive skin types I through VI. *Arch Dermatol*. 1988;124(6):869-871.
- U.S. Department of Health and Human Services. Physical activity guidelines for Americans. Available from: URL: www.health.gov/paguidelines. Accessed September 2, 2014.
- Graubard BI, Korn EL. Predictive margins with survey data. *Biometrics*. 1999;55(2):652-659.
- Abroms L, Jorgensen CM, Southwell BG, Geller AC, Emmons KM. Gender differences in young adults' beliefs about sunscreen use. *Health Educ Behav*. 2003;30(1):29-43.
- Galindo GR, Mayer JA, Slymen D, et al. Sun sensitivity in 5 US ethnorracial groups. *Cutis*. 2007;80(1):25-30.
- Battie C, Gohara M, Verschoore M, Roberts W. Skin cancer in skin of color: an update on current facts, trends, and misconceptions. *J Drugs Dermatol*. 2013;12(2):194-198.
- Pichon LC, Corral I, Landrine H, Mayer JA, Norman GJ. Sun-protection behaviors among African Americans. *Am J Prev Med*. 2010;38(3):288-295.
- Holman DM, Berkowitz Z, Guy GP Jr, Hartman AM, Perna FM. The association between demographic and behavioral characteristics and sunburn among U.S. adults - National Health Interview Survey, 2010. *Prev Med*. 2014;63:6-12.
- Dadlani C, Orlow SJ. Planning for a brighter future: a review of sun protection and barriers to behavioral change in children and adolescents. *Dermatol Online J*. 2008;14(9):1.
- Courtenay WH. Constructions of masculinity and their influence on men's well-being: a theory of gender and health. *Soc Sci Med*. 2000;50(10):1385-1401.
- George PM, Kuskowski M, Schmidt C. Trends in photo-protection in American fashion magazines, 1983-1993. Will fashion make you look old and ugly? *J Am Acad Dermatol*. 1996;34(3):424-428.
- Lee ET, O'Riordan D, Swetter SM, Demierre MF, Brooks K, Geller AC. Sun care advertising in popular U.S. magazines. *Am J Health Promot*. 2006;20(5):349-352.
- Mahe E, Beauchet A, de Maleissye MF, Saiag P. Are sunscreens luxury products? *J Am Acad Dermatol*. 2011;65(3):e73-e79.
- Wheless L, Ruczinski I, Alani RM, et al. The association between skin characteristics and skin cancer prevention behaviors. *Cancer Epidemiol Biomarkers Prev*. 2009;18(10):2613-2619.
- Coups EJ, Manne SL, Heckman CJ. Multiple skin cancer risk behaviors in the U.S. population. *Am J Prev Med*. 2008;34(2):87-93.
- Jansen R, Osterwalder U, Wang SQ, Burnett M, Lim HW. Photo-protection: part II. Sunscreen: development, efficacy, and controversies. *J Am Acad Dermatol*. 2013;69(6):867.e1-867.e14.
- International Agency for Research on Cancer. Sunscreens. Chapter 3. Human Use of Sunscreen. In: *IARC Handbook of Cancer Prevention*. Vol 5. Lyon (France): International Agency for Research on Cancer, World Health Organization; 2001.
- U.S. Department of Health and Human Services. The Surgeon General's call to action to prevent skin cancer. Available from: URL: <http://www.surgeongeneral.gov/library/calls/prevent-skin-cancer/>. Accessed September 2, 2014.
- Community Preventive Services Task Force. Cancer prevention and control—preventing skin cancer. Available from: URL: <http://www.thecommunityguide.org/cancer/index.html>. Accessed September 2, 2014.
- US Preventive Services Task Force. Behavioral counseling to prevent skin cancer. Available from: URL: <http://www.uspreventiveservicestaskforce.org/uspstf/uspsskco.htm>. Accessed September 2, 2014.
- Centers for Disease Control and Prevention. Overweight and obesity. Available from: URL: <http://www.cdc.gov/obesity/adult/defining.html>. Accessed March 6, 2015.

Supplemental Table I. Comparison of the unweighted and weighted 2013 Summer ConsumerStyles data with the 2013 Census estimates on select demographic variables

	Current population survey 2013*	Unweighted Summer ConsumerStyles data	Weighted Summer ConsumerStyles data
Gender			
Male	48.1%	47.6%	48.1%
Female	51.9%	52.4%	51.9%
Age, y			
18-24	12.6%	6.5%	12.2%
25-34	17.5%	11.7%	17.3%
35-44	16.8%	16.0%	16.7%
45-54	18.4%	22.8%	18.4%
55-64	16.5%	21.2%	16.8%
≥65	18.2%	21.9%	18.6%
Region			
Northeast	18.2%	17.9%	18.4%
Midwest	21.4%	25.2%	21.7%
South	37.2%	34.7%	37.2%
West	23.2%	22.1%	22.7%
Annual household income			
<\$25,000	18.7%	15.9%	18.4%
\$25,000-\$39,000	14.6%	16.5%	14.8%
\$40,000-\$59,000	16.8%	19.0%	17.2%
≥\$60,000	49.9%	48.6%	49.6%
Race/ethnicity			
Non-Hispanic white	66.0%	76.7%	67.4%
Non-Hispanic black	11.6%	8.8%	11.3%
Hispanic	15.0%	9.0%	14.2%
Non-Hispanic other	7.5%	5.5%	7.2%
Education			
<High school	12.6%	5.9%	11.5%
High school	29.6%	27.5%	30.0%
Some college	28.8%	32.2%	29.0%
≥Bachelor's degree	29.0%	34.4%	29.5%
Metropolitan statistical area status			
Nonmetro	15.9%	16.2%	15.8%
Metro	84.1%	83.8%	84.2%
Household Internet access			
No	24.4%	12.4%	22.9%
Yes	75.6%	87.6%	77.1%
Household size			
1	14.4%	17.6%	14.7%
2	34.2%	38.3%	34.8%
3	19.0%	18.4%	19.3%
4	17.4%	14.9%	17.2%
≥5	15.0%	10.8%	14.0%

From Porter Novelli. *Styles 2013 Methodology*. 2013.

*Data are taken from the Current Population Survey, which interviews a sample of the population annually. The sample consists of 52,809 households and 99,692 persons. Weights are then provided to project the data to the US total 122 million households and 236 million adults.